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ABSTRACT

Traditional attempts at development--such as sending in food, sending in educators, and then sending in technology from developed countries--have not been very successful in the development of Third World countries since these attempts began in the 1950s and 1960s. At that time, education, especially vocational education, was seen as the great path to economic development for these countries. Later, assessment of educational programs showed that, in many cases, developmental objectives had not been met. Instead, vocational education had tried to impart manual skills to the privileged few, who preferred academic training and unemployment to such "demeaning" tasks, while failing to reach vast numbers of underprivileged people. A better approach may be that of "nonformal education," which focuses on transmission of immediately needed skills, combined with technological training, in the production of immediately useful goods and services. Technological training projects that exemplify this approach include a small scale weavers' project in Botswana, a retraining project for unemployed fishermen in Ghana, and a credit cooperative in Afghanistan. By focusing on practical education, the duo of nonformal education and technological training may also help to reduce illiteracy and thus contribute to true development, the transformation of learning opportunities for the underprivileged by the developed countries. (KC)

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The Role of Technology Education in Third World Development

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The Role of Technology Education in

Third World Development

The period of decolonization that began at the conclusion of the Second World War, although somewhat abated, has continued to the present time. The end of the British Raj in India and the resultant formation of the free and independent countries of Pakistan and India in 1947 signaled the beginning of a new world order. Colonialism, imperialism, and exploitation of long-conquered lands were no longer to be tolerated. Freedom and independence of all nations, and for all peoples, were the new goals set by the world's most influential leaders. One after another, former colonies won or were given their independence--Nigeria, Malawi, Tanzania, Kenya, Egypt, Algeria, Singapore, Indonesia, Malaysia, Guyana, Surinam, Zaire and Zimbabwe.

But the transition from a protected colony to a free and independent nation was not always an easy matter. Problems quickly developed in many of the new countries. Many of these problems were directly related to a country having been a colony. For example, exploitation of resources left many nations without an economic foundation from which to function; the lack of a trained and educated indigenous cadre to replace the expatriate personnel in key political positions often led to chaos, revolt, and revolution; and this same lack of replacement personnel in the technical areas often led to regression in the industrial, agricultural, and service sectors, which also added to the economic problems.

Virtually all of these former colonies, as well as many other non-progressing countries throughout the world, needed massive support from

the wealthier, more developed nations if they were to survive. The only question was, what type of support should be given? An obvious model to employ was the successful scheme used to rebuild Europe and Japan at the conclusion of World World II. First, there was a massive contribution of food, clothing, fuel, and building materials so that the survivors could regain the basic necessities of life--food, clothing, and shelter. Once the people were reasonably settled, seed monies and technologies were introduced to stimulate economic growth and development, particularly in the industrial sector (Drucker, 1968; Owens & Shaw, 1972).

The results of these efforts astounded even the most expectant development program planners. Within five years allied and former enemy countries alike had progressed to a situation whereby they were enjoying economic stability, industrial growth including independent development, and at least partial agricultural self-sufficiency. Why not, then, apply this same successful development scheme to the lesser developed countries of the Third World?

Thus, the development assistance programs initiated by highly-developed nations during the 1950's and 1960's centered around three major areas--food exports to needy nations, economic development programs, and the stimulation of the industrial sector. Although they were not entirely ignored, agricultural and rural development programs were looked upon as secondary areas of concern.

The Third World began to look to development, or modernization as it was also being called, as their panacea - the all-seeing, all-knowing instrument to solve all their problems. The definitions of these terms clearly reflected this trend. Joseph Szyliowicz (1973), for example stated that

> In general terms modernization may be defined as a process that involves the transformation of man, his society, and his culture, and has at its core a fundamental belief in rationality and scientific thought. It is a process of unparalled scope and intensity, involving the transformation of static traditional societies into nations that can continuously generate, absorb, sustain and process ubiquitous change (p.4).

The Egyptian Undersecretary of State, Mohammed Hassan, wrote that development implies an "increase in the country's utilization of technology, its advancement toward industrialization, the development of agriculture on a scientific basis, the improvement of production networks, and the scientific trend in administration, public works and services" (Koth, 1974, p. 187).

When the development of Third World countries first became a major world issue during the late 1950's and early 1960's, almost everyone agreed that the key to development lay in the transfer of already known and tested technolcgies from the highly developed nations to the lesser developed countries. It was further agreed that an extensive education program to train the indigenous population in the methods for operating these new technologies was also a major necessity.

During this period of the 1960's confidence in education was at its euphoric high. Educational injections, formally conceived, were regarded as the means of promoting development (Simmons, 1980, p. xiii). Education was perceived as a means for increasing the number of skilled workers and raising the level of trained manpower in addition to raising political and social conciousness. D.S. Kothari, chairman of the University Grants Commission in New Delhi, wrote that education was society's most powerful instrument for development and as such should promote a sense of common

citizenship and culture, promote national integration and contribute to the world stock of rapidly expanding knowledge and technology.

In 1962, the World Bank began lending money to Third World countries to improve and expand their educational programs. "From 1963 to 1970,... lending was largely restricted to hardware and those areas of education that directly met the needs for manpower as they were perceived at that time" (World Bank, 1980, p.7). By mid-1971 the World Bank had made education loans totaling $431 million, and had plans to increase its lending rate in the education field by at least a factor of three within the next few years (Coombs & Ahmed, 1974, p.4). "Thus in the minds of the people and their leaders a new and far-reaching importance was added to the traditional values of education" (Huq, 1975, p.1).

Nearly three decades have passed since those original optomistic development programs were initiated and it is not difficult to see how unsuccessful they were. Despite numerous legitimate attempts at development assistance, few Third World countries have made much progress in development. In fact, the populus of many of these countries are worse off now than they were then. The reasons for this phenomenon are many, but it is becoming increasingly clear that the type of technical education prescribed has played a major role in the failure of these Third World countries to progress toward a more dignified life. As early as 1974 Robert McNamara stated that "while millions of people from among the educated are unemployed, millions of jobs are waiting to be done because people with the right education, training and skills cannot be found....[That is] one of the most disturbing paradoxes of our time" (Simmons, 1980 frontispiece). It was also in 1974 that the World Bank stated that the formal educational systems had been "irrelevant to the needs of developing countries for the past two decades" (World Bank, 1974, p.3).

Speaking to the development problems in Latin America, Ivan Illich (1972) stated that:

> Comtemporary Latin America needs school systems no more than it needs railroad tracks. Both - spanning continents - served to speed the now-rich and established nations into the industrial age. Both, if handled with care, are harmless heirlooms from the Victorian period. But neither is relevant to countries emerging from primitive agriculture directly into the jet age. Latin America cannot afford to maintain the outmoded social institutions amid modern technological processes (p.63).

Bradford Morse then Undersecretary General to the United Nations, wrote in the Foreward to Owens and Shaw's Development Reconsidered that:

> Development has turned out to be a much more complicated problem than had been thought when the foreign aid program began. In the beginning, it was assumed the solucion lay in merely transplanting the same kind of techniques and knowhow that have been the key to progress for most of the western world, accompanied by enough money to allow these vital techniques to take root in their new environment, but the transplants haven't worked (p.xv).

More specifically, Hallak and Caillods (1981) in research published by UNESCO, found the formal education sector irrelevant because it attempted to provide pre-vocational and vocational training for secondary students "already highly selected, with a view to encouraging them to enter the traditional sector, whereas precisely the fact that they belong to a select group, privileged both socially and educationally, will lead them to look for work in the modern sector" (p.108). As such, these elites often prefer to remain unemployed, somethimes for years, rather than accept a position they consider below their status. This is because the modern sector,

while it is highly capital-intensive, and has high productivity and high wages, also has a small absorption capacity in terms of manpower.

Meanwhile the human resources in the traditional sector, often comprising as much as sixty percent of the workforce, remain unaided, their potential untapped. For example, even a cursory glance at Table 1 reveals the magnitude of this lack of attention paid to the traditional sector by education. Of all the heads of businesses surveyed in the traditional sector of the five sample African cities, an average of less than eight percent had received vocational training. Just over twenty-one percent of the persons running electrical repair shops in Dakar had had vocational training, the highest figure in the survey. Compared to the modern sector, the traditional sector has low productivity and wages, but it does have the capacity to absorb both the expansion of existing enterprises and the development of new ones. However, too often the economic level of development is confined to that of subsistence.

One of the major reasons for the inability of these persons to progress beyond the subsistence level can be found in Table 2. Now we find that not only do many of these entrepreneurs lack vocational or technical training, but they have had no education at all or if they had they are still functionally illiterate. On average, more than twenty-five percent of these businessmen were found to be illiterate, the highest percentage, sixty-one percent being found in the construction sector of Ougadougou.

As early as 1963, Philip Foster (1968) was alluding to what he termed the vocational school fallacy in development planning. In a paper presented to a Conference on Education and Economic Development , Foster stated that "vocational curricula are ill designed to serve the needs of developing countries"(p. 615). Using Ghana as an example, he showed that, despite strenuous efforts by first the British Colonial powers and later the

Ghanian government, to implement, expand and/or revise vocational education programs since 1842, the present vocational curricula was still introducing the wrong skills to the wrong persons. He added that:

> The financial rewards and the extent of employment opportunities for technically trained individuals were never commensurate with opportunities in the clerical field, and the product of the academic school was manifestly more advantageously placed. One of the major ironies of the situation is that at the same time that proponents of technical education were criticizing the neglect of technical provisions in the schools the products of such technical institutions as there were often experienced difficulties in obtaining employment and frequently did not enter occupations related to the training they had undergone (p. 616).

Specifically, Foster believed that this wastage of trained manpower was common to most developing countries and manifested itself in the following three ways:

1. Initially, trained individuals may be produced for whom there is no actual demand so far as the market is concerned.
2. Secondly, a real demand may exist for trained personnel but at the same time scarce personnel are not utilized and skilled workers are involved in tasks not directly relevant to their professional accomplishments.
3. Thirdly, the position does arise where skilled personnel do not enter the type of job for which they have been trained because opportunities seem so much greater in alternative occupations. (p. 616)

J.S. Furnivall (1956), when dicussing colonial policy in what is now Indonesia, stated that "the encouragement of technical qualifications implies that it is possible to create industries by training men to practice them" (p. 286). This, obviously cannot be. Colletta and Holsinger (1980), when writing on education and development, emphasized that:

> Clearly, learning has to move as closely as possible to the point of utilization and productivity. Owens and Shaw's suggestion of a 'knowledge - communication -production - system' emphasizing horizontal rather than vertical relationships as central to reconsidering development, is another step in meeting the problem (p.151).

The World Bank's latest sector policy paper on education reported that:

> Many developing countries, in an attempt to adopt the content of secondary education to the expected job needs of those leaving school, have diversified the curriculum by introducing practical or occupational subjects into an otherwise completely academic program (World Bank, 1980, p.44).

The World Bank cautioned Third World countries to proceed slowly with this alternative. This diversified curricula, they pointed out, is complex and expensive; "they will require new teachers, new curricula, additional physical resources and high maintenance costs and skills" (p.45).

A classic example of these occurrances is apparent when reviewing the pre-vocational education program in Sri Lanka. Introducted at the four year junior secondary level 1972, the program was designed for the student to have the following knowledge, skills and attitudes at the

completion of the term.

Students should:

1. Execute selected manual skills related to vocations with an appropriate degree of proficiency
2. Comprehend appropriate aspects of selected vocations
3. Have knowledge of major vocations practiced in the community
4. Have an awareness that knowledge gained in other studies such as mathematics, science and social studies can be applied in studying about vocations
5. Have a feeling of confidence and pride in their ability to participate in the production of marketable goods or services. (Diyasena, 1976, pp. 8-9)

The program was evaluated after four years under a grant by the Asian Centre of Educational Innovation for Development. The three major problems identified were: 1. the lack of satisfactory resource materials, such as handbooks and supplementary reading materials; 2. the inadequacy of the teaching force's preparation for implementing the new curricula designs, materials, teaching techniques, testing instruments, etc., and 3. the unavailability of physical facilities and equipment.

The World Bank also stated that there had been no consistent empirical research which indicated that student's attitudes toward labor was changed; the students still preferred academic curricula to vocational training. Finally, they cautioned that developing an occupational curriculum that was in harmony with the needs of a local economy is a delicate task and miscalculations result in the underutilization of expensive facilities.

Regarding technical and vocational skills themselves, the World Bank

stated that "Twenty-five years of experience has not resolved the controversy about the formation of skills within the formal system" (p. 45). Therefore, the World Bank hedged its bets, calling for vocational and technical schools to impart general skills to large groups of trainees, training which can be applied in a variety of work situations and/or that will prepare graduates for on-the-job and apprenticeship training.

It appears that the World Bank is advocating or at least suggesting that vocational education in the Third World become as schizophrenic as American vocational education has been proported to be. As Paul Violas (1981) described it:

> On one side [vocational educators] seem cognizant of the significant transformation of the modern workplace which has significanlty reduced the need for cognitive and manipulative skills at many work stations. Thus, we sometimes see recommendations for a reduction of emphasis on science and math training, arguments that the older apprenctice-type training with its emphasis on skills is no longer appropriate and exhortations about development of simple "entry-level skills." Conversely, and sometimes simultaneously, they have worked from a conceptual framework dominated by a romantic, nineteenth century artisan conception of the work place, modified only slightly with the acknowledgement of the introduction of drudgery-lessening technology. In this mode they assume that the modern work place is one where the worker needs specific cognitive and manipulative skills in order to apply the developing technology. (p. 144)

It seems highly doubtful that vocational education, itself unclear as to its goals and objectives, will be the solution to the problems related to education and its role in development.

What then is the solution? Or perhaps more importantly, is there a solution? If one looks back at the original charge given to education it appears that it had been given an impossible task. It was to be the catalyst to overnight transform the lesser developed countries of the world into modern societies. That educators even attempted this task, doomed to failure from the start, appears in retrospect to have been sheer folly. Yet, when reviewing the past twenty-five years or so of development, there can be found several glimmers of at least partial success. Enough apparently, to give the eternal optimists in education enough fuel to continue trying. One of these brighter glimmers has been in the area of non-formal education. It is within this type of education that I believe vocational, technical, industrial and technology education all have a place to contribute. It is through this medium that I further believe that true development will take place; development designed to assist all levels of a society by increasing their quality of life.

Coined by Philip Coombs in 1968, the term non-formal education has become a distinct form of education, as different from formal and informal education as they are from each other:

> By formal education, we mean the deliberate and systematic transmission of knowledge, skills, and attitudes (with the stress on knowledge) within an explicit, defined, and structured format for space, time, and material, with set qualifications for teacher and learner, such as are typified in the technology of schooling.

> Informal education is the incidental transmittal of attitudes, knowledge, and skills (with stress on attitudes) within highly diverse and culturally relative patterns for the organization of time, space, and material, and also for personal roles and relationships such as are implicit in varying configurations of family, household, community, and of course, the school. Non-formal education is like formal in the deliberate and systematic transmission of knowledge, attitudes, and skills, except the stress is on skills. In terms of process, it avoids the technology of formal schooling, permitting a more diverse and flexible deployment of space, time, and material, and accepting a relaxation of personal qualifications in response to the structure of the workplace. (Colleta and Holsinger, 1982, p. 147).

Colleta and Holsinger (1982), when assessing the impact of non-formal education, found that it was most effective when the educational operations were focusing on tasks that were psychomoter, concrete, and skill oriented. Their obvious example was tasks learned for the technologies of the work place. They found that non-formal education was the best of the three types of education to combine thought and sentiment into useful action. Finally, they found that non-formal education was better than formal education in promoting cultural and social change because it operated within the reality structure of the sociocultural mileau.

Regarding non-formal education's place within the world-wide development scheme, Grandstaff (1974) believes that there are seven major

characteristics which can aid in deciding whether or not a particular development project was best suited to incorporate non-formal education. These seven characteristics were listed as follows:

1. Low per capita or per instructional unit costs.
2. Limited time duration, with frequent completion points at which students may terminate.
3. A clear base in immediate human needs - whether economic, political, social, health, nutritional, etc.
4. A recognition of, and responsive accomodation to, the operations of the participants.
5. A solid linkage to real employment opportunities, especially those such as labor-intensive agriculture and industry.
6. A working provision for decentralized planning and alteration at the level of use.
7. A high potential for distribution of whatever commodities are associated with the program - education, economic gain, improved health, better nutrition, etc. (p. 47)

A close examination of these charateristics reveal that they have great compatability with the criteria for appropriate technology. In fact, some of the exact terms are replicated in both sets of characteristics. Appropriate technology criteria normally calls for projects that are low cost, labor intensive, use local resources (both material and human), are decentralized and produce products that are not only immediately useful but are also simple to operate, maintain and repair. Simmons (1980 a) claims that technical education should be advocating economically appropriate technologies which stress practicality and ease of repair rather than

those engineered for early obsolescence. It is not difficult to foresee how this could be accomplished by instituting a development project based on the combined criteria of non-formal education and appropriate technology.

Non-formal education has been teamed with technology training in such diverse development projects as skills training programs for adults, youth mobilization projects and women and production schemes. Examples of skills training for adults include: in Africa, a small-scale weavers project in Botswana, the production of appropriate tools by the handicapped in Nigeria, a small-scale rural enterprise scheme in Kenya, and a retraining project for unemployed fishermen in Ghana; in Asia, a credit cooperative in Afghanistan, a cottage industry training program in India, and an agricultural skills and management project in Malaysia; in Latin America, a project to improve worker productivity in Bolivia, a mobile agricultural training project in Colombia, a sewing cooperative in Mexico, and a rural communication project in Guatemala. (see NFE Exchange newsletter issues 9/10, 11 and 22)

Finally, it has been suggested that this dynamic duo of non-formal education and technology training can enhance both development and general education in yet another way. One of the more embarrassing failures for education in the Third World during the past two decades has been its attack on literacy. Maktar M'Bow, Director General of UNESCO stated in 1980 that while the percentage of illiterates had declined in the past fourteen years from 32.4 percent to 28.9 percent, there were still some 814 million illiterate persons in the world. What's more, 130 million of this number were children between the ages of six and eleven who were receiving no education whatsoever. He predicted that if the present

trends continued, the number of illiterates will reach one billion by the year 2000.

The most pervasive problem in literacy projects appears to be that of retention. In many cases there is not a real or even a perceived need to know. Materials necessary to continue learning or to practice what has already been learned are often unavailable once the initial program has been completed. In an effort to combat this situation, pilot projects have recently been implemented where the literacy training is directly related to, and part of, the technology training. Such programs could provide the comprehensive training and education required to finally and actually improve the overall lifestyle of the project participants.

For lest we forget, that is the primary purpose of all this activity - true development. As Edmond King (1965) of the University of London stated "The dream of the underpriviledged majority of mankind is true development. Sometimes called the second phase of the Industrial Revolution, development [is the] systematic application to social relationships of mechanized and urban-style abundance, with corresponding transformation of all learning opportunities" (P.X). It is up to us, the priviledged minority, to help make their dream come true.

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TABLE 1

FORMAL VOCATIONAL TRAINING OF HEADS OF BUSINESSES IN THE TRADITIONAL SECTOR (PERCENTAGES)

CITY	NO VOCATIONAL TRAINING
DAKAR	
ALL SECTORS	88.6
METALWORK	92.3
CARPENTRY	81.1
FURNITURE MAKER	91.1
BRICKMAKER	89.4
MASON	87.0
ELECTRICAL REPAIRS	78.7
MECHANICAL REPAIRS	93.2
WATCH REPAIRS	93.5
OUGADOUGAU	
ALL SECTORS	92.0
ARTS & CRAFTS	89.2
TAILOR	88.8
WEAVER	90.4
FURNITURE MAKER	96.2
CONSTRUCTION	96.1
SMALL SCALE SERVICES	80.5
TRADE	97.6
NOUAKCHOTT	
ALL SECTORS	95.4
PRODUCTION	98.2
CONSTRUCTION	91.8
SERVICES	94.7

CITY	NO VOCATIONAL TRAINING
KUMASI	
ALL SECTORS	90.3
LOME	
ALL SECTORS	97.4
PRODUCTION (TIMBER)	97.8
PRODUCTION (METAL)	95.2
JOURNEYMAN (CONSTRUCTION)	100.0
CRAFTSMAN (CONSTRUCTION)	95.8
SMALL SCALE MECHANICAL	100.0
ELECTRICAL REPAIRS	100.0
MECHANICAL REPAIRS	100.0

(ADAPTED FROM: HALLACK, J. & CAILLODS, F. EDUCATION, TRAINING AND THE TRADITIONAL SECTOR, PARIS: UNESCO, 1981.)

TABLE 2

EDUCATIONAL BACKGROUND OF HEADS OF BUSINESSES (PERCENTAGES)

CITY	ILLITERATE OR NO EDUCATION
DAKAR	
ALL SECTORS	12.8
METALWORK	36.9
CARPENTRY	8.1
FURNITURE-MAKER	13.3
BRICKMAKER	15.7
MASON	7.4
ELECTRIC REPAIRS	11.4
MECHANICAL REPAIRS	4.2
WATCH REPAIRS	11.4
OUGADOUGOU	
ALL SECTORS	47.7
ARTS & CRAFTS	35.1
TAILOR	16.6
WEAVER	59.5
FURNITURE-MAKER	19.2
CONSTRUCTION	61.5
SMALL SCALE SERVICES	41.6
TRADE	53.4
NOUAKSCHOTT	
ALL SECTORS	22.1
PRODUCTION	32.1
CONSTRUCTION	8.1
SERVICES	21.1

CITY	ILLITERATE OR NO EDUCATION
KUMASI	
ALL SECTORS	27.5
LOME	
ALL SECTORS	25.0
PRODUCTION (TIMBER)	35.5
PRODUCTION (METAL)	42.9
JOURNEYMAN (CONSTRUCTION)	16.7
CRAFTSMAN (CONTRUCTION)	4.2
SMALL-SCALE MECHANICAL	35.3
ELECTRIC REPAIRS	00.0
MECHANICAL REPAIRS	21.2

(ADAPTED FROM: HALLECK, J. & CAILLODS, F. EDUCATION, TRAINING AND THE TRADITIONAL SECTOR, PARIS: UNESCO, 1981.)